ABSTRACT OF THE DISCLOSURE

An electrical resistive device for sensing hydrogen gas, including: an array of titania nanotubes open at an outwardly-directed end formed by anodizing at least a portion of a titanium layer; a plurality of palladium (or other noble metal) clusters having been deposited atop the nanotube array; and the nanotube array mechanically supported by an integral support member. The array of titania nanotubes may include a dopant in an amount less than 1% by mass. An exposure of the titania nanotube array to radiant energy emitted within a range of frequencies from visible to ultraviolet, in the presence of oxygen, removes at least a portion of a contaminant, if present on the titania nanotubes. The titanium layer may be deposited atop the integral support; or the unique doped titanium layer can be produced, prior to the anodizing thereof, by depositing titanium along with dopant atop the integral support member by a co-deposition process. The titanium layer may be a titanium foil or doped titanium foil. The device, as adapted for use to remove a contaminant (*such as* liquid crude petroleum, pathogens, *e.g.*, virus, bacteria, fungi, and proteins) from the array of nanotubes, will do so photocatalytically by exposure thereof to radiant energy emitted within a range of frequencies from visible to ultraviolet, in the presence of oxygen. Also, supported is: method(s) of producing the electrical resistive devices for sensing hydrogen gas.